APPENDIX A

BENTONITE
MATERIAL SAFETY DATA INFORMATION

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FISHER SCIENTIFIC, CHEMICAL DI -- BENTONITE
==========================================================
MSDS Safety Information
==========================================================
FSC: 6850
NIIN: 00-263-8640
MSDS Date: 11/06/1991
MSDS Num: BMWRL
Product ID: BENTONITE
MFN: 01
Responsible Party
Cage: 1B464
Name: FISHER SCIENTIFIC, CHEMICAL DIV.
Address: 1 REAGENT LANE
City: FAIR LAWN NJ 07410
Info Phone Number: 201-796-7100
Emergency Phone Number: 201-796-7100 OR 201-796-7523
Review Ind: Y
Published: Y
==========================================================
Contractor Summary
==========================================================
Cage: 1B464
Name: FISHER SCIENTIFIC CO.  CHEMICAL MFG DIV
Address: 1 REAGENT LANE
City: FAIRLAWN NJ 07410-2802
Phone: 201-796-7100
==========================================================
Item Description Information
==========================================================
Item Manager: S9G
Item Name: DESICCANT,ACTIVATED
Specification Number: MIL-D-3464E
Type/Grade/Class: TYPE I
Unit of Issue: CN
Quantitative Expression: 00000000005GL
UI Container Qty: 1
Type of Container: CAN/PAIL
==========================================================
Ingredients
==========================================================
Cas: 1302-78-9
RTECS #: CT9450000
Name: BENTONITE (AS NUISANCE DUST OR PARTICULATES NOT OTHERWISE REGULATED)
% Wt: 100
OSHA PEL: 15 MG/M3 TOTAL DUST
ACGIH TLV: 10 MG/M3 TDUST;8990
==========================================================
Health Hazards Data
==========================================================
LD50 LC50 Mixture: LD50 (INTRAVENOUS, AT) 35 MG/KG
Route Of Entry Inds - Inhalation: YES
Skin: YES
Ingestion: NO
Carcinogenicity Inds - NTP: NO
IARC: NO
OSHA: NO
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Effects of Exposure: ACUTE-INHALE:HIGH CONCENTRATIONS OF DUST MAY CAUSE
  IRRITATION.SKIN:NO ADVERSE EFFECTS.EYE:PARTICLES IN THE EYE MAY CAUSE
  IRRITATION.ORAL:INGESTION OF LARGE AMOUNTS MAY CAUSE INTESTINAL
  OBSTRUCTION.CHR ONIC-MAY CAUSE PNEUMOCONIOSIS,CHEST
  PAIN,COUGH,DYSPNEA,CYANOSIS,FATIGUE & BRONCHITIS.
Signs And Symptions Of Overexposure: HIGH CONCENTRATIONS OF DUST MAY CAUSE
  IRRITATION BY INHALATION. PARTICLES IN THE EYE MAY CAUSE IRRITATION.
  INGESTION OF LARGE AMOUNTS MAY CAUSE INTESTINAL OBSTRUCTION.
Medical Cond Aggravated By Exposure: PERSONS WITH PRE-EXISTING RESPIRATORY
  DISORDERS BE MORE SUSCEPTIBLE TO THE EFFECTS OF THE SUBSTANCE.
First Aid: GET MEDICAL ATTENTION IF SYMPTOMS PERSIST.SKIN:WASH WITH SOAP &
  WATER.EYE:FLUSH WITH WATER FOR 15 MINUTES,HOLDING EYELIDS OPEN.INHALED:REMOVE
  TO FRESH AIR & PROVIDE OXYGEN/CPR IF NEEDED.ORAL:DO NOT IN DUCE
  VOMITING.IF VOMITING OCCURS,KEEP HEAD BELOW HIPS DUE TO ASPIRATION
  HAZARD.TREAT SYMPTOMATICALLY AND SUPPORTIVELY.CALL PHYSICIAN.
==========
Handling and Disposal
==========
Spill Release Procedures: USE NIOSH APPROVED DUST MASK/RESPIRATOR &
  PROTECTIVE GLOVES. SWEEP UP OR VACUUM AND TRANSFER INTO A CONTAINER FOR LATER
  DISPOSAL OR RECOVERY.
Waste Disposal Methods: KEEP IN COVERED DRUMS, PENDING DISPOSAL. HANDLE &
  DISPOSE IN FULL COMPLIANCE WITH ALL APPLICABLE FEDERAL, STATE & LOCAL
  REGULATIONS.
Handling And Storage Precautions: STORAGE-STORE IN COOL,DRY,VENTILATED AREA
  AWAY FROM MOISTURE. KEEP CONTAINERS TIGHTLY CLOSED.
Other Precautions: AVOID CREATING DUST. PROVIDE ADEQUATE VENTILATION. DO NOT
  INHALE DUST. USE APPROVED DUST MASK/RESPIRATOR WHEN HANDLING MATERIAL ON
  LARGE SCALE.
==========
Fire and Explosion Hazard Information
==========
Flash Point Text: NONE
Extinguishing Media: WATER SPRAY, CO2, FOAM/DRY CHEMICAL. WATER SPRAY MAY BE
  USED TO KEEP FIRE EXPOSED CONTAINERS COOL & FLUSH SPILLS AWAY.
Fire Fighting Procedures: WEAR FULL PROTECTIVE CLOTHING AND NIOSH-APPROVED
  SELF-CONTAINED BREATHING APPARATUS. MOVE CONTAINER FROM FIRE AREA IF
  POSSIBLE. AVOID BREATHING VAPOR OR DUST.
Unusual Fire/Explosion Hazard: NEGLIGIBLE FIRE HAZARD
==========
Control Measures
==========
Respiratory Protection: USE NIOSH APPROVED DUST MASK/RESPIRATOR OR
  SELF-CONTAINED BREATHING APPARATUS.
Ventilation: GOOD GENERAL VENTILATION IS SUFFICIENT FOR MOST CONDITIONS (10
  ROOM VOLUMES PER HOUR).
Protective Gloves: AS REQUIRED
Eye Protection: DUST-RESISTANT SAFETY GOGGLES
Other Protective Equipment: EYE WASH STATION, QUICK DRENCH SHOWER AND
  IMPERVIOUS CLOTHING
Work Hygienic Practices: OBSERVE GOOD PERSONAL HYGIENE PRACTICES AND
  RECOMMENDED PROCEDURES. DO NOT WEAR CONTAMINATED CLOTHING OR FOOTWEAR.
==========
Physical/Chemical Properties
==========
HCC: N1
M.P/F.P Text: UNKNOWN
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Decomp Text: UNKNOWN
Spec Gravity: UNKNOWN
Solubility in Water: INSOLUBLE
Appearance and Odor: VERY FINE, ODORLESS, HYGROSCOPIC, PALE BUFF OR
  CREAM-COLORED TO GRAYISH POWDER
Corrosion Rate: UNKNOWN
==========================================================
Reactivity Data
==========================================================
Stability Indicator: YES
Stability Condition To Avoid: MOISTURE. SWELLS TO APPROXIMATELY TWELVE TIMES
  ITS VOLUME WHEN ADDED TO WATER.
Materials To Avoid: LITHIUM: MOLTEN LITHIUM ATTACKS SILICATES.
Hazardous Decomposition Products: THERMAL DECOMPOSITION MAY RELEASE ACRID SMOKE
  AND IRRITATING FUMES.
Hazardous Polymerization Indicator: NO
==========================================================
Toxicological Information
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Ecological Information
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MSDS Transport Information
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==========================================================
Regulatory Information
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==========================================================
Other Information
==========================================================
==========================================================
Transportation Information
==========================================================
Responsible Party Cage: 1B464
Trans ID NO: 62923
Product ID: BENTONITE
MSDS Prepared Date: 11/06/1991
Review Date: 06/02/1992
MFN: 1
Multiple KIT Number: 0
Review IND: Y
Unit Of Issue: CN
Container QTY: 1
Type Of Container: CAN/PAIL
==========================================================
Detail DOT Information
==========================================================
DOT PSN Code: ZZZ
DOT Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
==========================================================
Detail IMO Information
==========================================================
IMO PSN Code: ZZZ
IMO Proper Shipping Name: NOT REGULATED FOR THIS MODE OF TRANSPORTATION
==========================================================
Detail IATA Information
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==========================================================
IATA PSN Code: ZZZ
IATA Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
==========================================================
Detail AFI Information
==========================================================
AFI PSN Code: ZZZ
AFI Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
==========================================================
HAZCOM Label
==========================================================
Product ID: BENTONITE
Cage: 1B464
Company Name: FISHER SCIENTIFIC CO.  CHEMICAL MFG DIV
Street: 1 REAGENT LANE
City: FAIRLAWN NJ
Zipcode: 07410-2802
Health Emergency Phone: 201-796-7100 OR 201-796-7523
Label Required IND: Y
Date Of Label Review: 06/02/1992
Status Code: C
MFG Label NO: UNKNOWN
Label Date: 06/02/1992
Origination Code: F
Eye Protection IND: YES
Signal Word: CAUTION
Health Hazard: Slight
Contact Hazard: Slight
Fire Hazard: None
Reactivity Hazard: None
Hazard And Precautions: ACUTE-INHALE:HIGH CONCENTRATIONS OF DUST MAY CAUSE
  IRRITATION.SKIN:NO ADVERSE EFFECTS.EYE:PARTICLES IN THE EYE MAY CAUSE
  IRRITATION.ORAL:INGESTION OF LARGE AMOUNTS MAY CAUSE INTESTINAL
  OBSTRUCTION.CHR ONIC-MAY CAUSE PNEUMOCONIOSIS,CHEST
  PAIN,COUGH,DYSPNEA,CYANOSIS,FATIGUE & BRONCHITIS.STORAGE-STORE IN
  COOL,DRY AREA.KEEP CONTAINERS TIGHTLY CLOSED.FIRST AID-GET MEDICAL ATTENTION
  IF SYMPTOMS PERSIST.S KIN:WASH WITH SOAP & WATER.EYE:FLUSH WITH WATER FOR
  15 MINUTES,HOLDING EYELIDS OPEN.INHALED:REMOVE TO FRESH AIR & PROVIDE
  OXYGEN/CPR IF NEEDED.ORAL:DO NOT INDUCE VOMITING.IF VOMITING OCCURS,KEEP HEAD
   BELOW HIPS.TREAT SYMPTOMATICALLY.CALL PHYSICIAN.
==========================================================
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  particular situation regardless of similarity to a corresponding Department
  of Defense or other government situation.
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International Chemical Safety Cards

BENTONITE

ICSC: 0384

BENTONITE
Wilkinite

CAS # 1302-78-9
RTECS # CT9450000
ICSC # 0384

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Not combustible.		In case of fire in the surroundings: all extinguishing agents allowed.
EXPLOSION			
EXPOSURE		PREVENT DISPERSION OF DUST!	
• **INHALATION**		Avoid inhalation of fine dust and mist.	
• **SKIN**		Protective gloves.	
• **EYES**		Safety spectacles.	
• **INGESTION**			

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting (extra personal protection: P1 filter respirator for inert particles).		

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0384

IMPORTANT DATA	**PHYSICAL STATE; APPEARANCE:** ODOURLESS GRANULES OR POWDER IN VARIABLE COLOUR. **PHYSICAL DANGERS:** **CHEMICAL DANGERS:** The substance is a weak base in suspension in water. **OCCUPATIONAL EXPOSURE LIMITS (OELs):** TLV not established.	**ROUTES OF EXPOSURE:** The substance can be absorbed into the body by inhalation of dust. **INHALATION RISK:** Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly. **EFFECTS OF SHORT-TERM EXPOSURE:** **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** The substance may have effects on the lungs , resulting in silicosis due to the presence of crystalline silica (see ICSC # 0808).
PHYSICAL PROPERTIES	Relative density (water = 1): 2.5	Solubility in water: none
ENVIRONMENTAL DATA		

NOTES

Bentonites are aluminate silicate and can contain crystalline silica. The content varies widely from less than 1% to about 24%.

ADDITIONAL INFORMATION

ICSC: 0384 **BENTONITE**

IMPORTANT LEGAL NOTICE:	Neither the CEC or the IPCS nor any person acting on behalf of the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use.

APPENDIX B

BIOLOGICAL RESOURCES

Appendix B. Biological Resources.

Table B-1.
Plant species documented within the survey area for the proposed WR CT Site.

Scientific Name	Common Name
Arctostaphylos purissima	La Purisima manzanita
Astragalus sp.	Locoweed
*Avena barbata**	Slender wild oat
Baccharis pilularis	Coyote bush
*Bromus hordeaceus**	Soft-chess brome
Cardionema ramosissima	Sand mat
*Carpobrotus chilensis**	Sea fig
Castilleja sp.	Owl's clover
*Conyza sp.**	Horseweed
*Cortaderia jubata**	Jubata grass
Croton californicus	Croton
Deinandra increscens ssp. *villosa*†	Gaviota tarplant
Deinandra increscens ssp. *increscens*	Tarplant
*Ehrharta calycina**	Veldt grass
Ericameria ericoides	Mock heather
*Erodium botrys**	Filaree
Filago sp.	Herba impia
*Gnaphalium luteo-album**	Cudweed
Gnaphalium ramosissimum	Pink everlasting
Gnaphalium stramineum	Annual everlasting
Hazardia squarrosa	Saw-toothed goldenbush
Heteromeles arbutifolia	Toyon
Heterotheca grandiflora	Telegraph weed
Horkelia cuneata ssp. *sericea*†	Kellogg's horkelia
*Juniperus sp.**	Juniper
Lessingia filaginifolia	California-aster
Lotus scoparius	California broom
Lupinus arboreus	Tree lupine
Madia gracilis	Slender tarweed
*Medicago polymorpha**	California burclover
*Pinus radiata**	Monterey pine
Plagiobothrys sp.	Popcorn flower
*Plantago coronopus**	Cutleaf plantain
Plantago erecta	Annual plantain
Rhamnus californica	California cofeeberry
*Rumex acetosella**	Sheep sorel
Salvia mellifera	Black sage
Senecio blochmaniae	Blochman's groundsel
*Silene gallica**	Windmill pink
Solidago spathulata	Coast goldenrod
*Sonchus asper**	Prickly sow thistle
Stephanomeria virgata ssp. *virgata*	Wire-lettuce

† Federal or State listed species
* Non-native species

Table B-2.
Wildlife species occurring within the survey area for the proposed WR CT Site.

Scientific Name	Common Name	Occurrence
Amphibians		
Aneides lugubris	Arboreal salamander	Potential
Bufo boreas	Western toad	Potential
Ensatina eschscholtzii	Ensatina	Potential
Hyla regilla	Pacific treefrog	Potential
Reptiles		
Anniella pulchra pulchra†	Silvery legless lizard	Potential
Coluber constrictor	Racer	Potential
Crotalus viridis	Western rattlesnake	Potential
Elgaria multicarinata	Southern alligator lizard	Potential
Eumeces skiltonianus	Western skink	Potential
Lampropeltis getula	Common kingsnake	Potential
Masticophis lateralis	Striped racer	Potential
Phrynosoma coronatum frontale†	California horned lizard	Potential
Pituophis catenifer	Gopher snake	Potential
Sceloporus occidentalis	Western fence lizard	Documented
Thamnophis elegans	Western terrestrial garter snake	Potential
Thamnophis sirtalis	Common garter snake	Potential
Birds		
Accipiter cooperii†	Cooper's hawk	Potential
Accipiter striatus†	Sharp-shinned hawk	Potential
Agelaius phoeniceus	Red-winged blackbird	Potential
Aphelocoma californica	Western scrub jay	Potential
Aquila chrysaetos†	Golden eagle	Potential
Archilochus alexandri	Black-chinned hummingbird	Potential
Athene cunicularia hypugea†	Western burrowing owl	Potential
Bubo virginianus	Great horned owl	Documented
Buteo jamaicensis	Red-tailed hawk	Potential
Buteo lineatus	Red-shouldered hawk	Potential
Buteo regalis†	Ferruginous hawk	Potential
Callipepla californica	California quail	Potential
Calypte anna	Anna's hummingbird	Potential
Carduelis lawrencei†	Lawrence's goldfinch	Potential
Carduelis psaltria	Lesser goldfinch	Potential
Carduelis tristis	American goldfinch	Potential
Carpodacus mexicanus	House finch	Potential
Carpodacus purpureus	Purple finch	Potential
Cathartes aura	Turkey vulture	Potential
Chamaea fasciata	Wrentit	Documented
Charadrius vociferus	Killdeer	Documented
Chondestes grammacus	Lark sparrow	Potential
Circus cyaneus	Northern harrier	Potential
Colaptes auratus	Northern flicker	Documented
*Columba livia**	Rock dove	Potential
Corvus brachyrhynchos	American crow	Documented
Elanus leucurus†	White-tailed kite	Potential
Empidonax difficilis	Pacific-slope flycatcher	Potential
Euphagus cyanocephalus	Brewer's blackbird	Potential
Falco columbarius†	Merlin	Potential
Falco sparverius	American kestrel	Documented
Geococcyx californianus	Greater roadrunner	Potential
Lanius ludovicianus†	Loggerhead shrike	Documented

Scientific Name	Common Name	Occurrence
Birds		
Melospiza lincolnii	Lincoln's Sparrow	Documented
Melospiza melodia	Song sparrow	Documented
Mimus polyglottos	Northern mockingbird	Potential
*Molothrus ater**	Brown-headed cowbird	Potential
Passerella iliaca	Fox sparrow	Potential
Passerina amoena	Lazuli bunting	Potential
Pipilo crissalis	California towhee	Potential
Pipilo maculatus	Spotted towhee	Documented
Psaltriparus minimus	Bushtit	Potential
Sayornis nigricans	Black phoebe	Documented
Sayornis saya	Say's phoebe	Documented
Selasphorus sasin†	Allen's hummingbird	Potential
Sturnella neglecta	Western meadowlark	Documented
*Sturnus vulgaris**	European starling	Documented
Thryomanes bewickii	Bewick's wren	Documented
Toxostoma redivivum†	California thrasher	Potential
Troglodytes aedon	House wren	Potential
Turdus migratorius	American robin	Potential
Tyto alba	Barn owl	Potential
Zenaida macroura	Mourning dove	Documented
Zonotrichia atricapilla	Golden-crowned sparrow	Potential
Zonotrichia leucophrys	White-crowned sparrow	Documented
Mammals		
Canis latrans	Coyote	Documented
Chaetodipus californicus	California pocket mouse	Potential
*Didelphis virginiana**	Virginia opossum	Potential
Dipodomys agilis	Pacific kangaroo rat	Potential
Dipodomys heermanni	Heermann's kangaroo rat	Potential
Dipodomys sp.	Kangaroo rat	Documented
Lepus californicus	Black-tailed jackrabbit	Potential
Lynx rufus	Bobcat	Potential
Mephitis mephitis	Striped skunk	Potential
Microtus californicus	California vole	Potential
Mustela frenata	Long-tailed weasel	Potential
Odocoileus hemionus	Mule deer	Documented
Peromyscus californicus	California mouse	Potential
Peromyscus maniculatus	Deer mouse	Potential
Procyon lotor	Raccoon	Potential
Puma concolor	Mountain lion	Potential
Reithrodontomys megalotis	Western harvest mouse	Potential
Sorex ornatus	Ornate shrew	Potential
Sorex trowbridgii	Trowbridge's shrew	Potential
Spermophilus beecheyi	California ground squirrel	Potential
*Sus scrofa**	Wild pig	Potential
Sylvilagus bachmani	Brush Rabbit	Documented
Taxidea taxus	American badger	Documented
Thomomys bottae	Botta's pocket gopher	Potential
Urocyon cinereoargenteus	Gray fox	Potential

† Federal or State listed species

* Non-native species

APPENDIX C

CULTURAL RESOURCES

Appendix C. Cultural Resources.

Cultural Setting

The following summary of prehistory and ethnohistory is modified from Lebow and Moratto (2001). The historic overview derives primarily from Palmer (1999).

Prehistory

The prehistory of California's central coast spans the entire Holocene and may extend back to late Pleistocene times. In the Santa Barbara Channel region, a fluted Clovis point found on the surface of a coastal site suggests use of the area possibly as early as 11,000-12,000 years ago (Erlandson *et al.* 1987), while a site on San Miguel Island has yielded a radiocarbon date of 10,300 B.P. (Erlandson 1991). Recent calibrations suggest that terminal Pleistocene radiocarbon dates are about 2,000 years too recent (Fiedel 1999:95) and thus these early sites may be even older. In San Luis Obispo County, excavations at CA-SLO-2 in Diablo Canyon revealed an occupation older than 9,000 years (Greenwood 1972; Moratto 1984) and investigations at CA-SLO-1797 indicate initial occupations as early as 10,300 B.P. (Fitzgerald 1998). Occupations on Vandenberg AFB occurred by at least 9,000 years ago, based on radiocarbon dates from CA-SBA-931 at the mouth of the Santa Ynez River (Glassow 1990, 1996).

Moratto (1984) refers to these early occupations as Paleocoastal. Population densities were probably low, judging from the limited number of sites dated to this period. Diagnostic tools associated with this time period have not been identified, although similarities with the San Dieguito Complex in southern California (Wallace 1978; Warren 1967) have been suggested (Erlandson 1994). Cultural assemblages have few of the grinding implements common to subsequent periods. These sites are characterized by a strong maritime orientation and an apparent reliance on shellfish. Occupants are thought to have lived in small groups that had a relatively egalitarian social organization and a forager-type land-use strategy (Erlandson 1994; Glassow 1996; Greenwood 1972; Moratto 1984).

Site densities throughout the central coast are higher during the subsequent periods, suggesting increased population size and possibly better site preservation. Sites dating between about 8,000 and 6,500 years ago often have relatively high densities of manos and milling slabs that are typically associated with processing seeds. These milling stones are diagnostic of this period. Shellfish appear to have continued as a dietary staple throughout the central coast (Erlandson 1994; Glassow and Wilcoxon 1988), including Vandenberg AFB (Glassow 1996; Woodman *et al.* 1995). However, terrestrial mammals composed a larger portion of the diet on Vandenberg AFB during this period than during any other time (Glassow 1996; Rudolph 1991). Fish were a larger part of the diet than shellfish at Morro Bay in San Luis Obispo County, although shellfish were better represented during this period than during subsequent periods (Jones *et al.* 1994).

Early scholars associated sites of this age with inland knolls and terraces (e.g., Rogers 1929), but subsequent investigations revealed that coastal environments were also used (e.g., Glassow *et al.* 1988). Well-developed middens at many sites suggest a more sedentary and stable settlement system (Breschini *et al.* 1983). Glassow (1990, 1996) infers that occupants of Vandenberg AFB during this time were sedentary and had begun using a collector-type (i.e., logistically mobile) land-use strategy. Burial practices suggest that society was primarily egalitarian (Glassow 1996).

Population densities appear to have decreased substantially between 6500 and 5000 B.P. throughout the region, and little is known about this period. It is possible that arid conditions associated with the Altithermal degraded the environment to the point that only low population densities were possible (Glassow 1996; Glassow and Wilcoxon 1988).

After 5000 B.P., population densities increased to pre-6500 B.P. levels as conditions became cooler and more moist. Between 5000 and 3000 B.P., mortars and pestles became increasingly common throughout the region, suggesting intensified use of acorns (Basgall 1987), although these implements may have been associated with processing pulpy roots or tubers (Glassow 1997). Along the Santa Barbara Channel coastline, use of shellfish declined as other animal foods became more important. Use of more diverse environmental settings is suggested (Erlandson 1997). On Vandenberg AFB, fish and sea mammals composed a larger part of the diet during this period. Large side-notched and stemmed projectile points became more prevalent in the archaeological record, presumably reflecting increased hunting, although Glassow (1996) suggests that proportions of terrestrial mammals do not surpass the pre-6500 B.P. levels. However, higher proportions of terrestrial mammals in archaeological assemblages are associated with this period in San Luis Obispo County. Increased logistical organization is suggested in this area (Jones *et al.* 1994; Jones and Waugh 1995). Proportions of obsidian (indicating exchange with other regions) increased after about 5000 B.P., particularly in San Luis Obispo County (Jones *et al.* 1994; Jones and Waugh 1995).

Cultural complexity appears to have increased around 3,000-2,500 B.P. Based on mortuary data from the Santa Barbara area, King (1981, 1990) suggests a substantial change in social organization and political complexity about 3,000 years ago. According to King, high-status positions became hereditary and individuals began to accumulate wealth and control exchange systems. Arnold (1991, 1992) proposes that this evolutionary step in socioeconomic complexity occurred around 700-800 years ago.

The period between 2,500 and 800 years ago is marked by increased cultural complexity and technological innovation. Fishing and sea mammal hunting became increasingly important, corresponding to development of the *tomol* (a plank canoe), single-piece shell fishhooks, and harpoons (Glassow 1996; King 1990). The bow and arrow also was introduced during this period (Glenn 1990, 1991). Sites in San Luis Obispo County suggest that use of terrestrial mammals remained high. Proportions of imported obsidian continued to increase during this period (Jones *et al.* 1994).

Arnold (1992) proposes that the complex Chumash sociopolitical system known at historic contact evolved substantially during a brief period between A.D. 1150 and 1300, which she terms the Middle/Late Transitional Period. Arnold infers that decreased marine productivity caused by elevated sea-surface temperatures resulted in subsistence stress that allowed an elite population to control critical resources, labor, and key technologies, resulting in hierarchical social organization and a monetary system. Although the issue of elevated sea-surface temperatures has been questioned (e.g., Kennett 1998) and the inference of marine degradation and subsistence stress has been challenged (e.g., Raab *et al.* 1995; Raab and Larson 1997), the full emergence of Chumash cultural complexity around this time is generally accepted.

On Vandenberg AFB and in the Santa Barbara Channel region, population densities reached peak levels between 700 years ago and historic contact (Glassow 1990, 1996). Higher numbers of *Olivella* shell beads reflect increased exchange between the Channel Islands, the Santa Barbara mainland, and Vandenberg AFB. Increased subsistence diversity is apparent. Although shellfish continued to be a dietary staple in the Vandenberg area, the use of fish and birds increased, proportions of secondary species in shellfish assemblages increased (Glassow 1990), and dietary expansion is evident (Lebow and Harro 1998). Correspondingly, the range and diversity of site types increased as a greater range of habitats and resources was used (Glassow 1990; Lebow and Harro 1998; Woodman *et al.* 1991). In San Luis Obispo County, the settlement system appears to have changed substantially after 700 B.P. as residential bases along the coast were abandoned in favor of habitation sites farther inland. Coastal sites were used to obtain resources during short-term occupations (Breschini and Haversat 1988; Greenwood 1972; Jones *et al.* 1994; Jones and Waugh 1995). In addition, proportions of imported obsidian decreased substantially during this period (Jones *et al.* 1994).

Ethnohistory

People living in the Vandenberg AFB area prior to historic contact are grouped with the Purisimeño Chumash (Greenwood 1978; King 1984; Landberg 1965), one of several linguistically related members of the Chumash culture. Their social organization, traditions, cosmology, and material culture are described by Blackburn (1975), Grant (1978a, 1978b, 1978c, 1978d), Greenwood (1978), Hudson *et al.* (1977), Hudson and Blackburn (1982, 1985, 1986), Hudson and Underhay (1978), Johnson (1988), and Landberg (1965).

Accounts of early explorers in the Santa Barbara Channel area indicate that the Chumash people lived in large, densely populated villages with well-built structures (e.g., Bolton 1926, 1931; Engelhardt 1933; Fages 1937; Moriarity and Keistman 1968; Simpson 1939; Teggart 1911; Wagner 1929). With a total Chumash-speaking population estimated at 18,500 (Cook 1976) and employing a maritime economy, the Chumash had a culture that "was as elaborate as that of any hunter-gatherer society on earth" (Moratto 1984:118). Leadership was hereditary and chiefs exercised control over more than one village, reflecting a simple chiefdom social organization. The Chumash engaged in craft specialization and maintained exchange systems (Arnold 1992; Johnson 1988).

Relatively little is known about the Chumash in the Vandenberg region. Explorers noted that villages were smaller and lacked the formal structure found in the channel area (Greenwood 1978:520). Approximately 22 villages were used by the Purisimeño Chumash at historic contact, with populations between 30 and 200 per village (Glassow 1996:13-14). About five ethnohistoric villages are identified by King (1984:Figure 1) on Vandenberg AFB, along with another five villages in the general vicinity.

Unfortunately, early explorers paid scant attention to Chumash subsistence and settlements systems. Using ethnohistoric, ethnographic, and archaeological data, Landberg (1965) attempted to reconstruct those facets of Chumash lifeways. Chumash subsistence relied primarily on fishing, hunting, and gathering plants (primarily acorns). In the spring, groups left their winter villages for temporary camps where they gathered grasses, roots, tubers, and bulbs. Hunting marine mammals became important during times when seals and sea lions congregated at their rookeries. Bulbs, roots, and tubers also were gathered during the summer months as well, and seeds became important during this season, especially to the people north of Point Concepción. Interior groups moved to the coast during the spring and summer to collect shellfish. Coastal groups returned to

their villages in late summer and early fall to harvest large schooling fish such as tuna. Pine nuts were collected in the mountains during the fall months; acorns also were gathered in the late fall. Both of these resources, as well as berries collected during the late summer and early fall, were stored for use during the winter. Hunting also was important during the fall. Winter months were spent in villages, where residents relied primarily on stored foodstuffs as well as occasional fresh fish (Landberg 1965:102-104). Regional variation in subsistence strategies is evident in the ethnohistoric record (Landberg 1965:104-118); in the interior and along the northern coast of Chumash territory, marine resources were less important than acorns, seeds, and game (particularly deer).

Contact with early Euroamerican explorers, beginning with the maritime voyages of Cabrillo in A.D. 1542-1543, undoubtedly had an effect on the Chumash culture. The effect may have been profound. Erlandson and Bartoy (1995, 1996) and Preston (1996) convincingly argue that Old World diseases substantially impacted Chumash populations more than 200 years before Spanish occupation began in the 1770s.

Unquestionably, drastic changes to Chumash lifeways resulted from the Spanish occupation that began with the Portolá expedition in A.D. 1769. The first mission in Chumash territory was established in San Luis Obispo in 1772, followed in short order by San Buenaventura (1782), Santa Barbara (1786), and La Purísima Concepción, established in 1787 in the present location of Lompoc. The Santa Ynez Mission was established in 1804. Eventually, nearly the entire Chumash population was under the mission system (Grant 1978a). During the 1830s, the missions were secularized in an attempt to turn the mission centers into pueblos and make the Indians into Mexican citizens.

History

Vandenberg AFB history is divided into the Mission, Rancho, Anglo-Mexican, Americanization, Regional Culture, and Suburban periods (Palmer 1999). The Mission Period began with the early Spanish explorers and continued until 1820. Established in 1787, Mission La Purísima encompassed the area between Gaviota and Guadalupe. Farming and ranching were the primary economic activities at the Mission, which was responsible for supplying the Santa Barbara Presidio with food supplies. The Mission had 4,000 head of sheep by 1800; by 1812 they numbered 12,000 and by 1821 the count peaked at 23,546. Missionaries had the Chumash weave wool blankets for the Santa Barbara Presidio. Approximately 14,000 sheep remained when the Mission closed in 1835. In addition to sheep, wheat, barley, corn, peas, and beans were grown at Mission La Purísima. Agricultural activities primarily occurred along the major streams such as San Antonio Creek and the Santa Ynez River (Palmer 1999:2). A farming outpost for Mission La Purisima was established at the ethnohistoric village of *Estep* in the San Antonio Creek valley, several miles upstream from the proposed Western Range Command Transmit site (Palmer 1999:Appendix 1).

The Rancho Period of Vandenberg AFB history began in 1820 and continued until 1845 (Palmer 1999). Following secularization in 1834, the Alta California government granted former mission lands to Mexican citizens as ranchos. The Western Range Command Transit Site lies within Rancho Jesus Maria, which originally encompassed 42,184 acres and was granted to Lucas, Antonio, and Jose Olivera in 1837. Rancho Jesus Maria included lands from just south of Shuman Canyon (northern boundary) to the Santa Ynez River (southern boundary), and from the Pacific Ocean to a few kilometers east of San Antonio Terrace and Burton Mesa on the east (Tetra Tech 1988). Lucas Olivera is thought to have constructed an adobe at the site of the Marshallia Ranch

in 1837; this site is located about 1.3 miles northeast of the El Rancho Road bridge replacement project. By 1839, Antonio and Jose Olivera had sold their part of the land grant to Jose Valenzuela, who, in 1847, sold a one-third share to Don Pedro Carrillo and a one-third share to Lewis T. Burton. Cattle ranching was the primary economic activity during the Rancho Period; in the 1840s cattle were so abundant that only the hides had any value (Palmer 1999).

The Bear Flag Revolt and the Mexican War marked the beginning of the Anglo-Mexican Period (1845-1880). Cattle ranching continued to flourish during the early part of this period, with as many as 500,000 cattle in Santa Barbara County during the 1850s. However, severe droughts during the 1860s decimated cattle herds and less than 5,000 cattle remained in the entire county. The combination of drought and change in government from Mexican to the United States caused substantial changes in land ownership. By 1851, approximately 42 percent of the land grants were owned by non-Mexicans; by 1864, after a few years of drought, 90 percent of the southern California ranchos were mortgaged. The various shares in Rancho Jesus Maria changed hands, with Lewis Burton increasing his holdings. His son, Ben Burton, inherited all of Rancho Jesus Maria upon the death of Burton in 1879. Sheep ranching and grain farming replaced the old rancho system during this period. Dairy farming became an important economic activity during this time, particularly as Swiss-Italians immigrated into the area. Early roads were established during the 1860s and 1870s to obtain supplies that were surfed in at Point Sal. Farming remained a limited activity, due in part to the difficulty of shipping to markets. Lompoc was established during this period by the Lompoc Temperance Colony (Palmer 1999).

Increased population densities characterize the Americanization Period (1880-1915). The railroad reached the area in the late 1890s, and providing a more efficient means of shipping and receiving goods and supplies, which in turn increased economic activity. Ranching continued and agriculture increased, particularly with development of steam-powered threshers. Row crops became increasingly common, and sugar beets were one of the most economically important crops. Union Sugar Company had a substantial influence on economic growth in the region. Oil exploration began in earnest during this period. Union Oil began to purchase Rancho Jesus Maria property in 1903; they ultimately obtained subsurface rights to 120,000 acres in the area. Ben Burton leased the former Rancho Jesus Maria for grazing and farming during the early part of the Americanization Period. However, by 1900 the rancho was divided into four parcels and sold. These four parcels were further subdivided by 1906. Edwin Marshall formed the Jesus Maria Rancho Corporation in December of 1906; by the 1920s the Marshall Ranch encompassed 52,000 acres and prospered by raising cattle and beets. Its headquarters were constructed between 1906 and 1933 at the location of the Olivera adobe. An elaborate system of line camps and other facilities supported the ranch operations. Marshall also introduced eucalyptus trees as a potential source of commercial firewood.

Ranching and farming continued on the Marshall Ranch during the early part of The Period of Regional Culture (1915-1945). At various times, the Marshall Ranch experimented with game birds, chickens, turkeys, and purebred bulls. Grain was raised on coastal terraces, and Union Sugar purchased farm land in the San Antonio Valley from Marshall for agricultural purposes. In 1933, the Marshall family moved to the Olivera adobe, and expanded and modernized the building. A wooden-framed guest house was added in 1935 and a dude ranch operation began. The facility became known as the Marshallia Ranch and catered to Hollywood personalities. Visitors could arrive by airplane at an air strip in front of the house, and they could enjoy ranching activities, horseback riding, or tennis. The ranch was sold to Frank Long upon the death of Edwin Marshall in 1937. Cattle ranching and guest operations continued until the start of World War II, when the property was condemned for Camp Cooke. However, the army allowed the Marshallia Ranch to stay open to serve army officers. All ranching, farming, and dairy farming in the Vandenberg AFB area was substantially reduced when Camp Cooke was established in 1941. This army training

facility was built on approximately 90,000 acres along the coast, and included the area of Rancho Jesus Maria. Camp Cooke was deactivated at the end of World War II (Palmer 1999).

The Suburban Period (1945B1965) began with the end of World War II. After Camp Cooke was deactivated, the Army continued the historic tradition and leased much of the area for ranching and farming. Oil drilling reached its peak during this period. Union Oil drilled a number of wells on the San Antonio Terrace, and the Jesus Maria No. 4 produced commercial quantities of oil. Most of the Suburban Period is characterized by military use of the area. Camp Cooke was reactivated in 1950 for training during the Korean War. It was put into caretaker status from 1953 to 1956. The Cantonment area became so overgrown that sheep were used to manage the vegetation and reduce the fire hazard. In November of 1956, the army transferred 64,000 acres of North Camp Cooke to the Air Force, and it was renamed the Cooke Air Force Base (Palmer 1999). In 1958 the base had its first missile launch, the Thor, and was renamed Vandenberg AFB. The southern section of the current base was transferred to the Air Force from Army and Navy control in 1964 (Vandenberg AFB 1992). Post-transfer use of both North and South Vandenberg AFB has related primarily to the construction and operation of missile launch and support facilities. Specific activities include management of the launch, testing, and evaluation of ballistic missile and space systems for the DOD, and operation of the Western Range (Science Applications International Corporation [SAIC] 1995; Vandenberg AFB 1992).

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APPENDIX D

AIR QUALITY ANALYSIS

Appendix D. Air Quality Analysis

Technical Assumptions and Emission Calculation

The Proposed Action is to construct and operate a Western Range (WR) Command Transmit (CT) Site on Vandenberg Air Force Base (AFB), California, that would serve as a docking facility for two command transmitters to transmit radio carrier and frequency-modulated radio messages to launch vehicles, to activate flight termination functions in the event of an anomaly. Data for this analysis was obtained from 30th Space Wing Civil Engineer Squadron (30 CES) and the 30th Space Wing Space Communication Squadron (30 SCS) personnel involved with preparing the engineering analysis for the Proposed Action.

Proposed Action – Construction

Construction of the WR CT Site is scheduled to take 10 months, with a work schedule of eight hours per day, five days per week. The estimated crew size is six workers per activity for the length of the project. Average one-way commute for employees was assumed at 15 miles. Average project related pick-up truck commute was assumed at six miles. All delivery supply trucks were assumed to travel 60 miles one-way, while concrete trucks were assumed to travel 15 miles one-way.

Maps were used to estimate the area disturbed by the construction equipment. It was assumed that for a reasonable worst-case day, one-fifth the area would be disturbed, while for the average, one-tenth of the area would be disturbed.

Detailed analysis of the construction equipment for the Proposed Action is presented in Table D-1. Detailed analysis of the factors used to estimate the construction emissions are presented in Table D-2. Assumptions, based on normal construction practices were needed to augment the Vandenberg AFB data to estimate the construction emissions for the Proposed Action.

The emissions from the various sources were estimated on daily and project basis. The daily emissions were calculated by multiplying the emission factor by the appropriate equipment usage rate. Except for the PM_{10} emissions, the project emissions were estimated by multiplying the daily emissions for each source by the duration of the project. For the PM_{10} emissions, the project emissions were obtained by multiplying the average area disturbed by the length of the day and the duration of the project. Daily and total emissions for construction are presented in Tables D-3 and D-4, respectively.

Table D-1. Construction equipment usage for WR CT Site.

Emission Source	Fuel[e]	Horse Power Rating (HP)	Load Factor	Number of Units	Daily Duration (Hours)[d]	Proposed Action Usage		% of Proposed Action[d]
						Days	Hours	
Delivery Semi-Truck, Cat C15 Engine[f]	D	60	NA	1	4	160	640	80%
Trencher and plow, Ditch Witch, RT115	D	115	0.48	1	8	30	240	15%
Backhoe/Skiploader, Cat 410D	D	97	0.465	1	6	100	600	50%
Bulldozer, Track, John Deere 450H	D	74	0.59	2	6	100	1,200	50%
Crane, 25 Ton, RT552	D	152	0.43	1	2	100	200	50%
Compactor Ingersol Rand, SD-40	D	80	0.66	1	4	100	400	50%
Dump Truck, End	D	250	0.47	2	3	60	360	30%
Concrete Truck, Cat C11 Engine[a]	D	15	NA	4	8	20	640	10%
Generator Diesel , 48kW	D	64	0.74	1	8	10	80	5%
Boring Jack Unit, DD-1, American Augers	D	20	0.75	1	8	10	80	5%
Compactor Asphalt, Cat CB-434C	D	70	0.53	1	8	20	160	10%
Paver, Cat, BG-240	D	153	0.59	1	8	20	160	10%
Water Truck Ford L-800	D	210	0.47	1	4	100	400	50%
Street Sweeper, Sweepmaster 25, Waldon	D	80	0.68	1	1	160	160	80%
Pick-up Truck[c]	D	6	NA	2	4	200	4,800	100%
Miscellaneous Delivery Trucks[f]	NA	60	NA	2	NA	60	14,400	30%
Six Worker Commuting Vehicles per Day[a,g]	NA	15	NA	6	NA	200	36,000	100%
Fugitive Dust[b,g] - Peak Day	NA	8.27	NA	NA	8	1	NA	0.5%
Fugitive Dust[b,g] - Average Day	NA	0.83	NA	NA	8	200	NA	100%

Notes:
a Horse Power Rating is the number of miles traveled in one-way trip from Santa Maria. Project usage is total mileage.
b Horse Power Rating is acres disturbed per day. Calculations include total analyzed area, which is less than the total disturbed area.
c Horse Power Rating is average one-way mileage for traveling on site and coordinating north base activities. Number of Units is trips per day. Project Usage is total mileage.
d Same as Table 2-2 Equipment Use in Chapter 2, DOPAA, 10 Months, 5 work days/week=200 days total.
e D is diesel and G is gasoline
f Horse Power Rating is miles traveled in one-way trip from 60 miles. Number of Units is trips per day. Project Usage is total mileage.
g Same as EA paragraph 2-1, six workers per activity working eight-hour days.

Table D-2. Emission factors used to estimate construction emissions for WR CT Site.

Emission Source	Emission Factors (gm/BHP-hr)					Vehicle category[a]
	CO	NO_x	PM_{10}	ROC	SO_x	
Delivery Semi-Truck, Cat C15 Engine[b]	0.020984	0.028142	0.000500	0.002955	0.000246	On-Road Motor Vehicles
Trencher and plow, Ditch Witch, RT115	2.15	11.00	0.66	0.88	0.19	Track-type Tractor
Backhoe/Skiploader, Cat 410D	2.71	11.00	0.78	1.12	0.20	Wheeled Loader
Bulldozer, Track, John Deere 450H	2.15	8.80	0.66	0.88	0.19	Track-type Tractor
Crane, 25 Ton, RT552	4.60	11.00	0.86	1.16	0.21	Miscellaneous
Compactor Ingersol Rand, SD-40	4.60	11.00	0.86	1.16	0.21	Miscellaneous
Dump Truck, End	2.28	11.00	0.48	0.57	0.20	Off-Highway Truck
Concrete Truck, Cat C11 Engine[b]	0.020984	0.028142	0.000500	0.002955	0.000246	On-Road Motor Vehicles
Generator, 48kW	3.03	14.00	0.96	1.27	0.21	Industrial
Boring Jack Unit, DD-1, American Augers	4.60	11.00	0.86	1.16	0.21	Miscellaneous
Compactor Asphalt, Cat CB-434C	6.03	11.00	0.75	1.12	0.23	Roller
Paver, Cat, BG-230	4.60	11.00	0.86	1.16	0.21	Miscellaneous
Water Truck Ford L-800	2.28	11.00	0.48	0.57	0.20	Off-Highway Truck
Street Sweeper, Sweepmaster 25, Waldon	4.60	11.00	0.86	1.16	0.21	Miscellaneous
Pick-up Truck[b]	0.015165	0.001634	0.000079	0.001626	0.000010	On-Road Motor Vehicles
Miscellaneous Delivery Trucks[b]	0.020984	0.028142	0.000500	0.002955	0.000246	EMFAC 1965-2005
Worker Commuting[b]	0.015165	0.001634	0.000079	0.001626	0.000010	EMFAC 1965-2005
Fugitive Dust[c]	0.00	0.00	3.49	0.00	0.00	SBCAPCD

Note:
a Emission factors from SBCAPCD Form 24, Construction Equipment Uncontrolled Emission Factors.
b Emission factor from South Coast Air Quality Management District (SCAQMD) CEQA, On-Road Vehicles 2005 are in lbs/mile. EMFAC 2002 (version 2.2).
c Emission factor from SBCAPCD Form 24, Construction Equipment Uncontrolled Emission Factors, Fugitive Dust. Site watering will reduce PM10 emissions with 50% credit. PM10 (controlled) equals PM value times 0.64 times 0.50.

Table D-3. Proposed Action for WR CT Site daily construction emissions.

Emission Source	Daily Emmissions (lbs)				
	CO	NO_x	PM_{10}	ROC	SO_x
Delivery Semi-Truck, Cat C15 Engine[a]	2.5	3.4	0.1	0.4	0.0
Trencher and plow, Ditch Witch, RT115	2.1	10.7	0.6	0.9	0.2
Backhoe/Skiploader, Cat 410D	1.6	6.6	0.5	0.7	0.1
Bulldozer, Track, John Deere 450H	2.5	10.2	0.8	1.0	0.2
Crane, 25 Ton, RT552	1.3	3.2	0.2	0.3	0.1
Compactor Ingersol Rand, SD-40	2.1	5.1	0.4	0.5	0.1
Dump Truck, End	3.5	17.1	0.7	0.9	0.3
Concrete Truck, Cat C11 Engine[a]	2.5	3.4	0.1	0.4	0.0
Generator, 48kW	2.5	11.7	0.8	1.1	0.2
Boring Jack Unit, DD-1, American Augers	1.2	2.9	0.2	0.3	0.1
Compactor Asphalt, Cat CB-434C	3.9	7.2	0.5	0.7	0.2
Paver, Cat, BG-230	7.3	17.5	1.4	1.8	0.3
Water Truck Ford L-800	2.0	9.6	0.4	0.5	0.2
Street Sweeper, Sweepmaster 25, Waldon	0.6	1.3	0.1	0.1	0.0
Pick-up Truck[a]	0.4	0.0	0.0	0.0	0.0
Miscellaneous Delivery Trucks[a]	5.0	6.8	0.1	0.7	0.1
Worker Commuting[a]	2.7	0.3	0.0	0.3	0.0
Fugitive Dust	0.0	0.0	23.1	0.0	0.0
Total Daily Construction(lbs)	**43.9**	**116.9**	**30.0**	**10.6**	**2.0**

Note:
a Total daily emissions are based on miles driven.

Table D-4. Proposed Action for WR CT Site total construction emissions.

Emission Source	Project Emissions (lbs)				
	CO	NO_x	PM_{10}	ROC	SO_x
Delivery Semi-Truck, Cat C15 Engine[a]	13.4	18.0	0.3	1.9	0.2
Trencher and plow, Ditch Witch, RT115	62.8	321.3	19.3	25.7	5.5
Backhoe/Skiploader, Cat 410D	161.7	656.3	46.5	66.8	11.9
Bulldozer, Track, John Deere 450H	248.3	1,016.4	76.2	101.6	21.9
Crane, 25 Ton, RT552	132.6	317.0	24.8	33.4	6.1
Compactor Ingersol Rand, SD-40	214.2	512.2	40.0	54.0	9.8
Dump Truck, End	212.6	1,025.8	44.8	53.2	18.7
Concrete Truck, Cat C11 Engine[a]	13.4	18.0	0.3	1.9	0.2
Generator, 48kW	25.3	116.9	8.0	10.6	1.8
Boring Jack Unit, DD-1, American Augers	12.2	29.1	2.3	3.1	0.6
Compactor Asphalt, Cat CB-434C	78.9	144.0	9.8	14.7	3.0
Paver, Cat, BG-230	146.5	350.3	27.4	36.9	6.7
Water Truck Ford L-800	198.4	957.4	41.8	49.6	17.4
Street Sweeper, Sweepmaster 25, Waldon	88.3	211.1	16.5	22.3	4.0
Pick-up Truck[a]	72.8	7.8	0.4	7.8	0.0
Miscellaneous Delivery Trucks[a]	302.2	405.2	7.2	42.6	3.5
Worker Commuting[a]	545.9	58.8	2.9	58.5	0.4
Fugitive Dust	0.0	0.0	1,526.0	0.0	0.0
Total Proposed Action Construction (lbs)	**2,529.51**	**6,165.61**	**1,894.47**	**584.58**	**111.62**
Total Proposed Action Construction (Tons)	**1.26**	**3.08**	**0.95**	**0.29**	**0.06**

Note:
a Total emissions are based on miles driven.

Proposed Action – Operations

Operational data was derived from previous years estimates for launches and back-up generator hours. Current operations support 16 launches per year that require four personnel per launch for two full days (three shifts). Current back-up diesel generator (500Hp) operates on average 45 hours per year.

The proposed WR Ct facility would replace the current operational activities; however, there are two differences in the new facility operational activities; (1) Personnel will have an eight-mile roundtrip reduction in distance for travel to the new facility; and (2) there would be two 750-Hp back-up generator diesel internal combustion engines (instead of one 500-Hp). The proposed back-up generators will comply with the Stationary Diesel Airborne Toxic Control Measures (ATCM) standards. The analyses of operational activities and total operations emission factors are presented in Tables D-5 and D-6 respectively. Total annual operational emissions are included in Table D-7.

Table D-5. Operational activities for Western Range Command Transmit Site.

Emission Source	Fuel[a]	Horse Power Rating (HP)	Load Factor	Number of Units[b]	Daily Duration (Hours)	Proposed Action Use (Days)	Project Usage (Hours)[c]
Two Backup Generators	D	750	0.8	2	45	1	90
Six Worker Commuting Vehicles per Day[d]	NA	15	NA	20	NA	32	19,200

Notes:
a D is diesel .
b Number of Units is trips per day.
c Project usage is total mileage.
d Horse Power Rating is the number of miles traveled in one-way trip from Santa Maria. (These are current average operational activities: Four people per shift, three shifts per day, 16 launches per year, two days per launch. Two carpools per day.)

Table D-6. Emission factors used to estimate operational emissions for Western Range Command Transmit Site.

Emission Source	Emission Factors (gm/BHP-hr)					Vehicle Category[b]
	CO	NO_x	PM_{10}	ROC[d]	SO_x[c]	
Two Backup Generators	2.6	4.8	0.15	0.30	0.17	SBCAPCD
Six Worker Commuting Vehicles per Day[b]	0.015165	0.001634	0.000079	0.001626	0.000010	EMFAC 1965-2005

Notes:
a SBCAPDC Final Regulation Order, Airborne Toxic Control Measure For Stationary Compression Ignition Engines.
b Emission factor from South Coast Air Quality Management District (SCAQMD) CEQA, On-Road Vehicles 2005 are in lbs/mile. EMFAC 2002 (Version 2.2).
c APCD -42, Section 3.4, Large Stationary Diesel and All Stationary Dual-fuel Engines, Table 3.4-1.
d SBCAPCD, Technical Information and References, ROC/VOC Emission Factors and Reactivities for Common Source Types (Version 1.2, March 12, 2001)

Table D-7. Proposed Action for Western Range Command Transmit Site operational total emissions.

Emission Source	Annual Total Operational Emissions (Lbs and Tons)				
	CO	NO_x	PM_{10}	ROC	SO_x
Two Backup Generators	309.52	571.43	17.86	35.71	20.24
Six Worker Commuting Vehicles per Day[a]	291.2	31.4	1.5	31.2	0.2
Total Operational Proposed Action (Lbs)	**600.69**	**602.80**	**19.38**	**66.93**	**20.43**
Total Operational Proposed Action (Tons)	**0.30**	**0.30**	**0.01**	**0.03**	**0.01**

Note:
a Total emissions are based on miles driven.

Conformity Determination

The U.S. Air Force is required to make a formal conformity analysis to determine whether the Proposed Action at Vandenberg AFB complies with the air conformity rule found in the Clean Air Act (CAA). This determination is in accordance with conformity requirements set for the in 40 Code of Federal Regulations (CFR) 93.153 (b) and (c), *Determining Conformity of Federal Actions to State or Federal Implementation Plans, Applicability,* and section 176(c)(4) of the CAA.

Background

The Environmental Protection Agency (EPA) Final Conformity Rule requires federal agencies to ensure that any agency activity conforms to state- or federally-approved implementation plans. Conformity means ensuring the federal activity will not:

1) Cause a new violation of the National Ambient Air Quality Standards (NAAQS);
2) Contribute to an increase in the frequency or severity of violations of existing NAAQS; or
3) Delay the timely attainment of any NAAQS, interim milestones, or other milestones to achieve attainment.

The general conformity rule applies to federal actions that are not covered by the transportation conformity rule. Other than the listed exemptions and presumptions of conformity, the general conformity rule applies to actions in which projected emissions exceed applicable conformity *de minimis* thresholds. If project emissions are less than *de minimis* thresholds and are 10 percent or more of a nonattainment or maintenance area's total emissions of any criteria pollutant, then the action is considered "regionally significant" and the requirements of conformity determination apply. If the Proposed Action's direct and indirect emissions are less than the established *de minimis* thresholds, and are not considered regionally significant, the project is then assumed to be in conformity, and formal reporting of the conformity determination is not required.

Emission Thresholds and Quantification

The emission threshold for determining conformity is based on the NAAQS attainment standard for Santa Barbara County. Santa Barbara County is in attainment or unclassifiable for the NAAQS for carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), particulate matter 10 microns

or less diameter (PM_{10}), sulfur dioxide (SO_2), and ozone (O_3). The US EPA Region 9 has declared that the county is in attainment of the federal 1-hour ozone standard (USEPA Region 9 2003). U.S. EPA threshold limits used to determine general conformity are listed in Table D-8.

Emission quantification is defined as the sum of all direct and indirect criteria pollutants and precursor emissions, including stationary and mobile emission sources. Timing and location rather than the type of emission source distinguishes direct and indirect emissions. Direct emissions occur at the same time and place as the federal action. Indirect emissions include those that may occur later or at a distance from the federal action. General conformity limits the scope of indirect emissions to those that can be quantified and are reasonably foreseeable by the federal agency at the time of analysis, and those for which the federal agency can practicably control and will maintain control through its continuing program management responsibilities.

Table D-8. U.S. EPA threshold limits used to determine general conformity.

Criteria Pollutant Maintenance Status	Threshold Level (Tons/Year)
Ozone (NO, NO_2 or SO)	
All Maintenance Areas	100
Ozone [Volatile Organic Compound's (VOC's)]	
Maintenance areas inside an ozone transportation region	50
Maintenance areas outside an ozone transportation region	100
CO – All Maintenance Areas	100
PM_{10} - All Maintenance Areas	100
Pb - All Maintenance Areas	25

Source: 40 CFR 93.153(b), Protection of Environment, Determining Conformity Of Federal Actions To State Or Federal Implementation Plans, Applicability

Emissions Summary

As part of this conformity determination, the project emissions were compared with Santa Barbara County emissions. The latest, approved emission inventory is the 1999 Annual Emission Inventory, as found in the 2001 Clean Air Plan. Because Outer Continental Shelf sources are now part of Santa Barbara County Air Pollution Control District (SBCAPCD) jurisdiction and contribute to air quality impacts in Santa Barbara County, Outer Continental Shelf emission sources are included in the total emissions. Both inventories and the emission amounts that qualify as regional significant are presented in Table D-9. In Santa Barbara County, the term Reactive Organic Compounds (ROC) is used to describe that portion of Volatile Organic Compounds (VOC) that readily react in the atmosphere and produce ozone. The definition of ROC found in SBCAPCD Rule 102, *Definitions*, is identical to the U.S. EPA definition of VOC. They are used synonymously in this analysis.

Table D-9. 1999 Santa Barbara County (SBC) Annual Emission Inventory.

Source	Annual Emissions (Tons/Year)	
	NO_x	ROC
Santa Barbara County		
- Stationary Sources	2,001.46	3,051.82
- Area-Wide Sources	551.05	3,270.75
- Mobile Sources	15,316.54	9,351.65
Outer Continental Shelf		
- Stationary Sources	254.99	377.24
- Mobile Sources	10,356.26	651.23
Total SBC	*28,480.30*	*16,702.69*
Regional Significant Emissions	*2,848.03*	*1,670.27*

Source: 2001 Santa Barbara County APCD Clean Air Plan

Proposed Action Emissions and Conformity Determination

Due to the maintenance status of ozone for Santa Barbara County, the corresponding threshold of 100 tons per year for O_3 is used to determine general conformity. Because construction activities would occur prior to the operational activities, separate construction and operational emission calculations are presented for this determination.

Table D-10 shows a comparison of the estimated annual project emissions for construction with threshold and with regional significant emission levels. Table D-11 shows a comparison of estimated annual operational emissions with threshold and with regional significant emission levels.

Table D-10. Proposed Action construction emissions at Vandenberg AFB.

Source	Annual Construction Emissions (Tons/Year)		Exceeds Threshold or Regional Significant
	NO_x	ROC	
Project Construction Emissions[a]	3.08	0.29	No
De minimis Thresholds	100.00	100.00	
Regional Significant Emission Levels[b]	2,848.03	1,670.27	

Notes:
a These are project totals for 10 months, which are less than yearly totals. Values from Table D-4.
b Values from Table D-9.

Table D-11. Proposed Action operational emissions at Vandenberg AFB.

Source	Annual Operational Emissions (Tons/Year)		Exceeds Threshold or Regional Significant
	NO_x	ROC	
Project Operational Emissions[a]	0.30	0.03	No
De minimis Thresholds	100.00	100.00	
Regional Significant Emission Levels[b]	2,848.03	1,670.27	

Notes:
a Values from Table D-7.
b Values from Table D-9.

The total direct and indirect emissions for the construction and operation of the Western Range Command Transmit Site project do not exceed Federal *de minimis* conformity threshold values for O_3 precursors (NO_x and VOCs). In addition, total emissions of NO_x and VOCs from the Proposed Action are less than 10 percent of the latest approved Annual Emission Inventory for Santa Barbara County (2001 SBCAPCD Clean Air Plan). The Proposed Action is therefore deemed *de minimis* and not regionally significant and is exempt from further conformity requirements.